

ORIGINAL ARTICLE

Advance laparoscopy in minimal resource settings of Brig Shafique Ahmed Khan Niazi Memorial Trust Hospital, Bhakkar.

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ABSTRACT... Objective: To share our experience of performing basic and advance laparoscopic procedures with minimal resources in a small trust hospital of Bhakkar. **Study Design:** Retrospective study. **Setting:** Brig Shafique Ahmed Khan Niazi Memorial Trust Hospital, Bhakkar. **Period:** 19th April, 2020 to 11th February, 2022. **Methods:** No new intervention was done. On admission to hospital, an informed consent was taken. Another informed consent prior to surgery was taken as well. All the cases were done by a single surgical team. All the procedures were done according to proper guidelines and regulations. Procedures were again divided into basic and advance laparoscopic procedures. Laparoscopic cholecystectomy, laparoscopic appendectomy and diagnostic laparoscopy were considered as basic laparoscopic procedures. All others were classified as advance ones. Types of procedure, conversion to open surgery, complications and outcomes were recorded. **Results:** In 22 months duration total 1152 laparoscopic surgeries were performed at Brig Shafique Ahmed Khan Niazi Memorial Trust Hospital, Bhakkar. About 752 were basic and 400 were advance. About 12 procedures were converted to open. The complication rate recorded was about 2%. **Conclusion:** Advance laparoscopic procedures can be safely performed in trust hospitals of lower middle income countries with limited resources.

Key words: Advance Laparoscopy, Basic Laparoscopy, Cost Effectiveness, Morbidity, Mortality.

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INTRODUCTION

There are disadvantages as well. First and the foremost disadvantage is the “learning curve” of the new surgical techniques. Complications are expected early in the surgeon’s overall experience of minimally invasive techniques or when an experienced surgeon shifts to a new procedure. The utilization of gas for creating space in cavity also has risks. Viscus perforation while getting entry into body cavity, hemodynamic changes, ventilatory changes and gas embolism are observed as well. Procedure specific risks are also identified like port site metastasis after laparoscopic tumor surgery and hernia of port site and hemorrhage following any type of operation. These minimal access procedures usually require more time than required by traditional open surgery.¹

Disadvantages also include restricted vision, problem in hand-eye coordination, reduced mobility while handling instruments, 2D image lacking detailed information and limited field of vision throughout surgery.² The fixed entry points

in abdominal cavity causes limited freedom of movement of instrument tip in the opposite direction of outer part of instrument, this technical drawback is called as fulcrum effect. Instability of camera leads to increased fatigue. Tactile feedback of limited degree decreases dexterity. These factors actually cause relatively long learning curve in laparoscopic techniques. Laparoscopic surgery utilizing robotic platform is arising as a promising field of investigation.^{3,4}

Large variety stereoscopic systems are now developed to minimize these problems. Tremors can be minimized by making use of robot arm manipulated system with tremor filtration. The handheld and console-based surgical systems allow full seven degrees of freedom, thus playing an important role in increasing dexterity.^{5,6}

Same advantages of laparoscopy in low resource countries are controversial. Still laparoscopic surgery is being offered in low resource countries and is gaining popularity as well.

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Different strategies are adapted in public sector and trust hospitals to reduce cost of laparoscopic techniques. Multiple case series are published regarding this, highlighting this issue in lower income countries. A systemic review found it to be safe, effective and cost-effective.⁷⁻⁹

Working in a trust hospital, we initiated our own laparoscopic surgery services. Multiple techniques were adapted and several compromises were done to ensure un-interrupted facility of laparoscopic techniques for our patients. We tried to manage performing simple laparoscopic procedures but jumped to advanced laparoscopic techniques. In our article we would like to share our experience of doing advanced laparoscopic procedures in a trust hospital of Bhakkar. Advanced stereoscopic and instrument manipulating surgical systems are used in order to overcome some of the shortcomings associated with conventional laparoscopy, thus leading to faster and accurate laparoscopy.

METHODS

A retrospective study was performed at Brig Shafique Ahmed Khan Niazi Memorial Trust Hospital, Bhakkar from 19th April, 2020 to 11th February, 2022. Ethical approval was taken from IRB (BSTH/22/40/5/3/20) removal was not required as this was a retrospective type study and review of our outcomes was taken only. No new intervention was done. On admission to hospital, an informed consent was taken. Another informed consent prior to surgery was taken as well. All the cases were done by a single surgical team. The study protocol was approved by ethical review committee.

All the procedures were done according to proper guidelines and regulations. Procedures were again divided into basic and advance laparoscopic procedures. Laparoscopic cholecystectomy, laparoscopic appendectomy and diagnostic laparoscopy were considered as basic laparoscopic procedures. All others were classified as advanced ones. Types of procedure, conversion to open surgery, complications and outcomes were recorded. Complications were graded according to Clavian Dindo Classification. Sterilization bags with Ethylene oxide capsules for re sterilization of disposable energy devices. High concentration was

used for alone box for storing the energy devices when these were not in bag. All laparoscopic instruments including telescopes were autoclaved and disinfectant solution was only used to sterilize port washers and wirings. For closure of hernial flaps vicryl was used. Skin was closed with Biosyn (monocryl by Covidien) or Caprosyn (by Covidien), 3M Steristrips were applied and covered with Leukomed patch dressings for next 7-10 days.

RESULTS

In 22 months duration total 1152 laparoscopic surgeries were performed in Brig Shafique Ahmed Khan Niazi Memorial Trust Hospital Bhakkar. About 752 were basic and 400 were advance. In 22 months period, Lap cholecystectomy 39% (n= 295), Lap appendectomy 57.7% (n=434), and Diagnostic Laparoscopy 3% (n=23). In case of difficult anatomy or frozen calot's triangle we preferred to perform subtotal cholecystectomy instead of total cholecystectomy.

In the mentioned time period, about 12 cases were converted from laparoscopic to open procedures. Details of these procedures along with the respective causes are mentioned in the Table-III. In addition, in laparoscopic needle assisted herniotomy in pediatric patients, there was no conversion to open; but we had to use a second loop to deal with sliding hernias of <3 month infants, two on the left and one on the right. Detailed post-operative complications grades along with their frequency and percentages are given below in Table-IV. This shows negligible complication rate of about 2%.

In addition, we opened one laparoscopic appendectomy within 24 hours; but in fact it was a ureteric stone that was missed on pre-operative ultrasound. It was dealt subsequently with URS and stand dusting of stone. The three recurrences included one laparoscopic lumbar hernia IPOM. Actually we had not primarily closed the defect resulting in bulging of IPOM in the defect. The other two were laparoscopic umbilical hernias for which we had done suturing initially as these defects were less than 2cm. but these resulted in recurrence. We then did redo surgeries. The two cases of post-operative osteitis pubis included one mild and one moderate. Former was successfully treated with

antibiotics and other was lost to follow up.

TABLE-II

Showing the detailed data of advance laparoscopic procedures

Sr#	Advance Laparoscopic Procedures	No.	%
1	Laparoscopic Bariatric Surgery (SASI)	6	1.5
2	Total Laparoscopic Hysterectomy (TLH)	117	29.25
3	TAPP / TEPP Hernia	105	26.25
4	Laparoscopic Umbilical Hernia	20	5
5	Laparoscopic Needle Hemiotomy	29	7.25
6	Laparoscopic Para Duodenal Hernia	1	0.25
7	Laparoscopic Ovarian Cystectomy	52	13
8	Laparoscopic Bilateral Salpingectomy	9	2.25
9	Laparoscopic Hysterosacropexy	13	3.25
10	Laparoscopic Rectopexy	3	0.75
11	Laparoscopic Removal Of IUCD	4	1
12	Laparoscopic VVF	1	0.25
13	Laparoscopic Pylolithotomy	1	0.25
14	Laparoscopic Graham's Patch for Du Perforation	4	1
15	Laparoscopic Hemicolectomy	4	1
16	Laparoscopic Vericolectomy	8	2
17	Laparoscopic Ureteric Stone	10	2.5
18	Laparoscopic Anderson Hynes	1	0.25
19	VATS Decortication	2	0.5
20	Laparoscopic Hydrated Cyst	1	0.25
21	Laparoscopic Adhesiolysis	2	0.5
22	Laparoscopic duodenojejunosomy	1	0.25
23	IPOM	5	1.25
24	Retroperitoneoscopic Pyelolithotomy	1	0.25
	Total	400	

TABLE-III

Showing the details the procedure with conversion from Lap to Open Surgery.

Procedure	Conversion From Lap to Open Surgery	N	Cause of Conversion	
1. Total laparoscopic hysterectomy		2	Invasive tumor	1
			Gas leakage via vault	1
			Inability to retract liver	1
2. Laparoscopic cholecystectomy		4	Bad port positioning and surgeon's exhaustion	1
			Early learning curve due to difficult anatomy	2
3. TAPP		1	Inability to make space because of densely adherent bladder due to previous surgery	1
4. Ovarian cystectomy		2	Severe endometriosis	2
5. Laparoscopic appendectomy		3	Difficult anatomy	2
			Cecal necrosis	1
Total		12		

DISCUSSION

Laparoscopy has no doubt proving itself to improve post-operative outcomes like early recovery and higher patient satisfaction. Unfortunately laparoscopic instruments are much expensive and the surgeons in lower middle income countries (LMICs) are not that experienced in laparoscopy.¹⁰

Usually, laparotomies are done in LMICs for diagnostic purposes and management. The use of laparoscopy in third world countries is comparatively less as compared to advanced countries. The particular advantages of laparoscopy and minimally invasive surgery, like, relatively less ratio of surgical site infections and comparatively earlier return to work are of great benefit for patients in LMICs for bearing their daily expenses. Laparoscopic procedures and training in that field is not cheap. The average cost of a total laparoscopic hysterectomy in the US is \$19,450, though prices can range from \$11,550 to \$27,325. The average cost of laparoscopic cholecystectomy is \$87,955 and the average cost of laparoscopic appendectomy ranges from Laparoscopic \$6,063 to \$11,445.

TABLE-IV

Showing the post-operative complications grades along with their frequency and percentages

Complications			N	Management
1a	Seroma formation	15	18	Aspiration (average 2 sessions with average aspirate of 50 ml)
1b	Osteitis pubis	2		1 treated with antibiotics. 1 lost to follow up
1c	Mycobacterium SSI	1		Took five months for treatment
2a	Abscess		7	Opened
2b	Recurrence		3	Opened
3.	Nil			Grade IV (ICU Admission)
4.	Nil			Grade V (Death)
Total			28	

Laparoscopic surgery is comparatively less practiced in third world countries (as compared to advanced countries) due to its cost.¹¹ Innovation is required for facing these challenges in LMICs. Laparoscopy is no doubt safe, feasible, effective and cost-effective in third world countries, but unfortunately it often remains limited in its acceptability, accessibility and quality.¹²

Mihanović et al. mentioned that they used ETOH for sterilization of instruments and energy devices. ETOH is normally used for sterilization of energy devices in LMICs. Instruments can be reused by re-sterilizing them by ETOH as this is comparatively a cheap method for re-sterilizing them. This practice is controversial but adapted by surgeons in developing countries to reduce the overall cost of procedure.¹³ Alexandra et al. proved that we can re-sterilize a ligasure energy device 10 times minimal without compromising on the sealing capacity of device. Some studies have mentioned reusing up to 20 times as well.¹⁴

Lost cost practice was followed and observed in our setup, as this was a trust hospital. For laparoscopy, metal trocars were used, that were sterilized by autoclaving. Sterilization bags with ethylene oxide capsules were used as well in our setup for re-sterilization of disposable energy devices. High concentration was used for alone box for storing the energy devices when these were not in bag. All laparoscopic instruments including telescopes

were autoclaved and disinfectant solution was used to sterilize port washers and wirings. All these manouvers helped reduced SSI to less than 0.5%.

Sajid et al. said that in inguinal hernias TAPP and TEP both were performed and mesh was fixed with sutures. A meta-analysis done has shown no difference in recurrence between mesh fixation with tackers or sutures.¹⁵ Ayyaz et al. claimed that for TEP there will be no difference in recurrence whether you fix the mesh or not.¹⁶ Suture fixation can be considered as cost-effective alternative to tacker fixation, in small and medium-sized defects. Bansal et al. said that suture fixation requires a longer operation time, but patients end up with less post-operative pain.^{15,17}

In our setup for TAPP, we used silk for anchoring mesh instead of tackers. For flap closure we used vicryl. For small sized umbilical hernias (less than 2cm) closure of defect by simple suturing was done.

For colorectal surgery, extracorporeal anastomosis reduces a lot of cost reduction by avoiding the use of expensive staplers and hand sewn anastomosis can be safely done outside. The small size of wound is not compromised in it as same size incision would be required to remove the specimen. It is however associated with longer duration of hospital stay.^{10,18,19} In our setup we did extracorporeal anastomoses with the help of sutures, as staples were considered expensive in our setting. Kocak et al. showed

that giving a single dose of 2 g of first generation cephalosporins before laparoscopic procedure for infection prevention is clinically equivalent to the control group.²⁰

In our trust hospital, all patients were given a single shot of pre-operative antibiotic and a single post-operative antibiotic shot followed by oral antibiotics for 3 days. Meticulous attention was given to Skin closure. All assistants were required to wash the port site wounds, change gloves, repaint the whole surgery site with povidone iodine and apply new drapes. All >10 mm ports were closed with vicryl 1.

CONCLUSION

Based on our experience of working in a trust hospital, it can be concluded that advance laparoscopic procedures can be safely performed in trust hospitals of lower middle income countries with limited resources.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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AUTHORSHIP AND CONTRIBUTION DECLARATION

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2	Jamal Anwar: Data collection, review of paper.
3	Shahryar Niazi: Data analysis.
4	Rameez: Data entry.
5	Tasneem Hafeez Alvi: Revisions.
6	Ayesha Akram: Data analysis.
7	Muhammad Ahsan: Paper writing.